UNITED
NATIONS

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Security Council

Distr.
GENERAL

S/24981
17 December 1992

ORIGINAL: ENGLISH

NOTE BY THE SECRETARY-GENERAL

The Secretary-General has the honour to transmit to the members of the Security Council the attached communication which he has received from the Acting Director General of the International Atomic Energy Agency (IAEA).

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Annex

Letter dated 10 December 1992 from the Acting Director General of the International Atomic Energy Agency addressed to the Secretary-General

Please find attached the report of the fifteenth IAEA inspection in Iraq under Security Council resolution 687 (1991). You may deem it appropriate to transmit the report to the members of the Security Council. The Director General remains, of course, available with the Chief Inspector, Demetrius Perricos, for any consultations you or the Council may wish to have.

(Signed) Boris SEMENOV
Acting Director General

REPORT ON THE FIFTEENTH IAEA ON-SITE INSPECTION IN IRAQ
UNDER SECURITY COUNCIL RESOLUTION 687 (1991)

8 - 18 November 1992

SALIENT POINTS

- The sampling of the waterways of Iraq, begun during IAEA-14, was concluded during the fifteenth mission. The 37 sites sampled during this inspection brings the total number of sites sampled, along the full length of the Tigris-Euphrates watershed, to 52. More than 550 water and sediment samples have been collected.

- A detailed assessment of the conditions for removal of the irradiated fuel was carried out by experts. The assessment included an evaluation of fuel design, exposure history and current storage conditions. The experts estimate that the fuel removal operation, once begun, will take 4 - 6 months.

- The 100 tonnes of maraging steel declared by the Iraqi side to have been procured for their centrifuge programme was destroyed by re-melting and diluting it with equal amounts of high carbon steel. The operation was carried out at a foundry in Basra under observation of inspectors.

- The R24 experimental EMIS magnet system (a 1 to 5 scale model of the 1200 mm magnets) was destroyed with cutting torches. The system included nine double pole magnets, a coil winding machine and the winding machine transport rails.

- The Iraqi side has acknowledged a role for the Engineering Design Center, located at Rashdiya on the outskirts of Baghdad, in the design aspect of the centrifuge enrichment programme. They have also identified the role of certain key technical staff. Interviews with these individuals have resulted in a more credible picture of the Iraqi centrifuge programme.

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- The importance of procurement data to the inspection process and the establishment of a basis for the long term monitoring programme was again emphasized to the Iraqi side. The political decision taken by Iraq, and previously communicated to the United Nations is still in place. The process of obtaining this information through Member State Governments continues to produce results, but the process is inherently slow.

- Work to identify and catalogue key machine tools in various Iraqi State Engineering Establishments continued during this inspection. Under United Nations Security Council resolution 715, Iraq is to update every six months, a declaration regarding facilities, materials and equipment starting from the situation as it existed on 1-1-89. Their reporting obligation covers all sites in Iraq, not just those belonging to the IAEC. The Iraqi side informed that they will officially submit a declaration covering the IAEC facilities as soon as possible after the end of the inspection. A draft was provided to the inspection team. A commitment was made to amend the declaration, covering the country as a whole, by the end of the year.

- The uranium waste material recovered at Al Jezira and moved to Al Tuwaitha was weighed, sampled for verification and transferred to storage (Location C) under IAEA seal. The re-verification of irradiated fuel at the IRT-5000 reactor and remedial actions to improve storage conditions for the irradiated fuel at Location B were completed. A number of additional nuclear material samples from previously verified material were taken to further evaluate Iraqi declarations regarding the processing of nuclear materials in the building 73 complex (Al Tuwaitha).

- In addition to the 37 water sampling sites, the inspection team visited 30 locations all over Iraq. These locations included known nuclear facilities, State Industrial Establishments, support or storage facilities and other sites not previously inspected.

  Some of these locations were visited as short-notice inspections with prior notifications, depending on the circumstances, of between 5 minutes and 2 hours.

- The team was not harassed in Baghdad or at any of the inspection sites. Security was tight but it did not interfere with inspection work. Arrangements by the Iraqi side necessary to accommodate the various inspection activities were made efficiently throughout the mission.

INTRODUCTION

1. This report summarizes the findings of the fifteenth inspection mission carried out by the IAEA under United Nations Security Council resolution 687 (1991) with the assistance and co-operation of the Special Commission of the United Nations. The mission took place from 8 - 18 November 1992 and was headed by Mr. Demetrius Perricos of the IAEA as Chief Inspector. The team consisted of 28 inspectors and 10 support staff; it comprised 20 nationalities. Five members of the inspection team departed Iraq on 16 November as work requiring their particular expertise was completed.

The objectives of the inspection mission were broadly:

- to complete a comprehensive radiometric survey, begun during IAEA-14, of the surface waters of Iraq. The goal is to look for evidence of prohibited activities and to establish a baseline for the longer term monitoring programme;

- to carry out an assessment, by experts, of the conditions for removal of the irradiated fuel;

- to observe the destruction of the 100 tonnes of maraging steel declared by the Iraqi side to have been procured for their gas centrifuge programme;

- to perform follow-up site visits and interviews regarding enrichment processes, relevant procurement data and the roles of certain key technical staff in the Iraqi centrifuge programme;

- to verify the nuclear material recovered from the Al Jezira uranium waste and to follow-up the uranium metallurgy work and other processes involving nuclear materials declared to have been carried out in the building 73 complex (Al Tuwaitha);

- to continue cataloguing and, where appropriate, applying IAEA seals for identification, machine tools and other equipment in IAEC and State manufacturing facilities;

- to carry out inspections at newly designated sites and monitoring inspections at other previously visited sites.

These objectives were assigned to four groups within the overall team, with a group leader responsible for co-ordinating the work of each group. A total of 29 facilities and sites, in addition to the 37 water sample collection locations, were inspected. These are shown in Table 1. A list of the correspondence between the Chief Inspector and the Iraqi counterpart that occurred during the fifteenth mission is included as Annex 1.

2. Six sites were inspected by the IAEA team for the first time. Four of these sites were new and designated to the IAEA for inspection by the UN Special Commission (UNSCOM):

- Baghdad Office of the IAEC (former IAEC guesthouse)
- Al Shaheed Brass Factory
- Al Kindi (SAAD-16), located in the Mosul area
- Badush Dam explosives storage bunker
- An Najaf tyre factory
- Al Kadissiyah small arms plant

Two of these locations had been visited before by UNSCOM inspection teams.

ACTIVITIES RELATED TO THE RADIOMETRIC HYDROLOGIC SURVEY

3. The objectives of the radiometric survey of the surface waters of Iraq are detection, i.e. the detection of undeclared nuclear facilities operating or that have operated in Iraq and characterization, i.e. the establishment of a baseline for the longer term monitoring programme. The survey involved the collection of water and sediment samples at identified locations in the Tigris and Euphrates Basins. Sampling points were selected along the Tigris and Euphrates rivers and their major tributaries; Greater Zab, little Zab, Nahr al Uzayni, Nahr Diyala, Nahr Gharraf, the New River (canal) and selected lake basins (see Figure 1).

4. The sampling effort was initiated during IAEA-14 and concluded during IAEA-15. Samples were collected at a total of 52 sites (15 during IAEA-14 and 37 during IAEA-15). The sampling protocol required the collection of 11 samples at each location. This included replicate samples for the Iraqi side and for archiving. The sample collection procedures and equipment maintenance/utilization principles established during IAEA-14 were used throughout the fifteenth mission (sample analysis details are

provided in the IAEA-14 inspection report). Two sampling teams, one operating in the north and the other to the west and south, made the collections. Transportation by helicopter with extended cruising range and a mounted vehicle proved to be an indispensable asset. Bad weather and difficulties of access to some locations resulted in frequent changes in the original timetable for collection of samples. Seven of the sample locations are in the Kurdish controlled area north of Mosul. The Iraqi side made it clear in advance that they could not provide security at these locations. The sample collection team proceeded without escort and succeeded in making the collections but not without some difficulties. Future requirements to collect samples at these locations must be carefully assessed.

5. Although final conclusions and recommendations must await the evaluation of the sample analysis data, current planning for the longer term monitoring regime includes two hydrologic sampling operations per year. The sampling operations will be carried out against about fifteen key monitoring sites with spot checks at other more isolated locations.

ACTIVITIES RELATED TO REMOVAL OF THE IRRADIATED FUEL

6. A small group of experts were included as part of the IAEA-15 inspection team for the express purpose of defining the operational requirements for removal of the irradiated fuel from Iraq. The irradiated fuel is stored in two pools at the IRT-5000 reactor facility and fifteen concrete storage tanks at Location B. The experts' principal conclusions are:

- all fuel assemblies are accessible and can be removed without major difficulties;

- a number of fuel assemblies contain rubble and silt which will necessitate a special cleaning operation before the assemblies are placed in shipping casks;

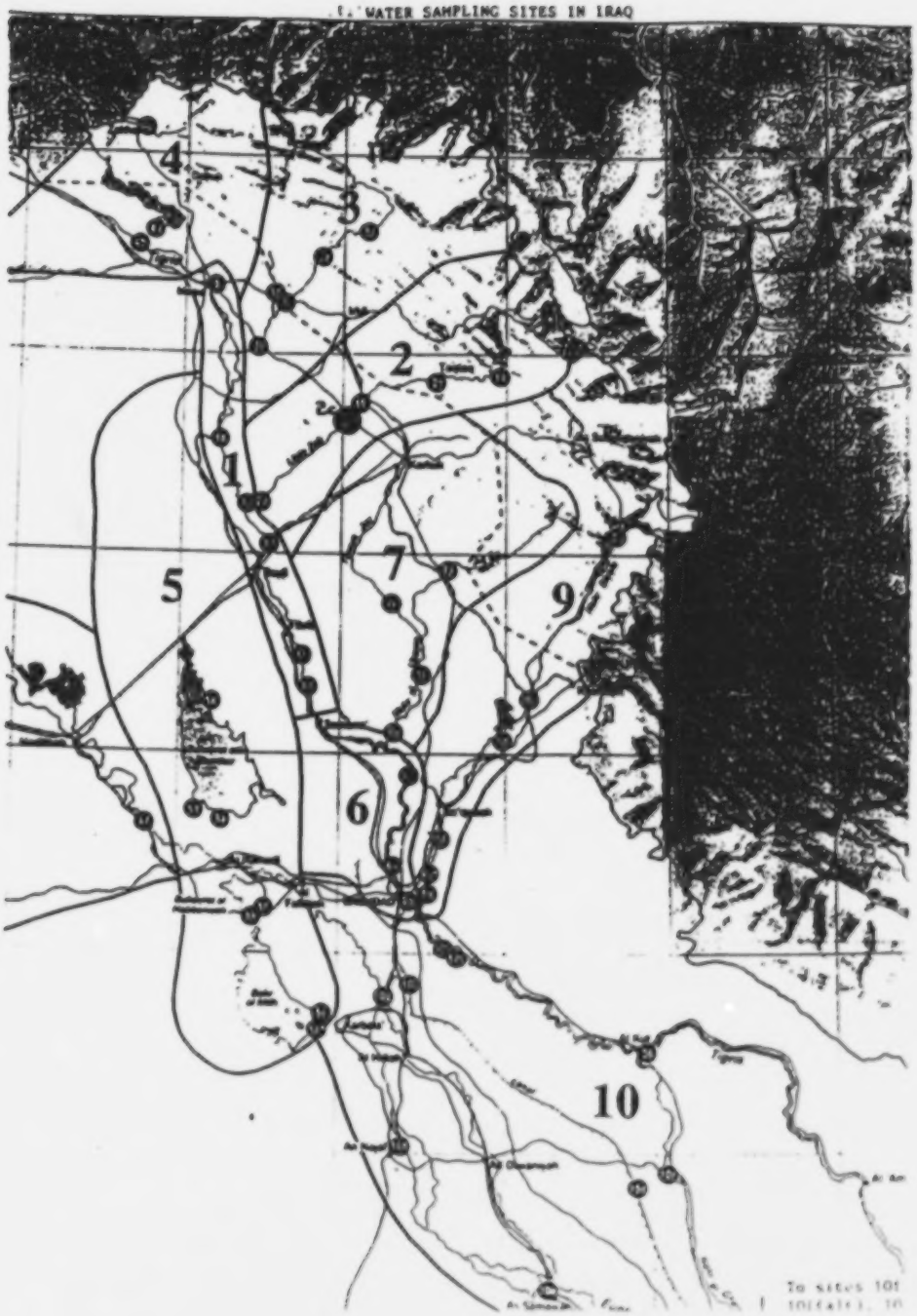
- loaded shipping casks must be moved to an area for decontamination and measurement to ensure that external radiation is at or below required shipping levels;

Table 1

List of facilities and sites inspected during the fifteenth inspection mission

1. Tuwaitha site and associated Locations B and C
2. Al Hamath
3. Al Nafad Storage
4. Ash Shakyli warehouses
5. Baghdad Office of IAEC (former IAEC guesthouse)
6. Tarmiya Site
7. Al Furat project site
8. Rashdiya Engineering Design Centre
9. Al Atheer Site
10. Al Atheer/Hatteen Headquarters
11. Ash Sharqat Site
12. Al Jezira Site and Al Jezira tank farms
13. Al Shaheed Brass Factory
14. Al Rafah (part of the Saddam General Establishment)
15. Badr Complex
16. Auqba bin Nafi Establishment
17. Al Radwan
18. Al Ameer
19. Nassr Establishment (Taji)
20. Taji (Project 144)
21. Al Rabiya (Al Nitah General Establishment)
22. Basra Steel Foundry
23. Al Hadre High Explosives Test Range
24. Al Kindi (SAAD-16)
25. Badush Dam Explosives Storage Bunker
26. An Najaf Tyre Factory
27. Al Kadissiyah Small Arms Plant
28. Al Dijla (Al Zaura)
29. Ibn Al Haytham Centre
30. Water Bodies Sampling Sites (37)

Figure 1



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- the removal plan will include substantial involvement from the Iraqi side;

- the estimated time for removal is 4-6 months once the operation has begun.

Iraqi experts were available for consultation throughout the assessment. They were able to provide detailed information that included exposure, cooling times and exact location of each fuel assembly.

ACTIVITIES RELATED TO THE ENRICHMENT PROGRAMME

7. At the request of the inspection team, a series of three meetings with senior technical staff previously involved in the Iraqi centrifuge programme was arranged. Most of the individuals that attended one or more of the meetings were specifically identified by the inspection team but the Iraqi side voluntarily included an individual who played a key role in mechanical design aspects of the programme.

The first two meetings dealt primarily with areas of specialization, centrifuge work assignments and current jobs for each of the individuals, the organizational content of the centrifuge programme vis-a-vis the overall PC-3/IAEC programme and a variety of technical details regarding materials selection and acquisition, UF_6 production process development and the centrifuge testing effort. The third meeting was devoted to a technical discussion of the centrifuge mechanical design work and the Iraqi developmental efforts with flow forming of centrifuge rotors.

8. One-by-one the assembled individuals identified their roles in the Iraqi centrifuge programme as:

- technical director of the centrifuge programme;

- a technical advisor (in his words "prominent" advisor) on design, manufacturing, material testing and training;

- a specialist in rotor dynamics who served as a consultant on the mechanical design of rotating components;

- a material scientist with responsibility in the centrifuge programme for material selection and testing, surface treatment, heat treatment, welding technology and flow forming;

- a process engineer with responsibility for process development for UF_6 production;

- a process engineer with responsibility for design and operation of centrifuge process testing.

Several of the individuals had worked on gaseous diffusion prior to their assignment to the centrifuge programme. In all cases but one (the former technical director of the programme), the people indicated that they have taken positions outside the IAEC contributing to "the reconstruction and industrialization" of the country. Details regarding current work assignments and locations were provided as requested by the inspection team. The rotor dynamics specialist indicated that he had never worked directly for the IAEC. His services as a consultant were supplied under a contract between the IAEC and his employer, the Engineering Design Centre at Rashdiya, which belonged to the Ministry of Industry and Military Industrialization. Contrary to previous denials, the Iraqi side acknowledged for the first time a connection between the centrifuge programme and Rashdiya. They were adamant, however, that no experimentations involving hardware beyond computer simulations in support of centrifuge design ever occurred or were planned to occur there.

9. The lack of any reference to the centrifuge programme among the myriad of activities described in the various PC-3 progress and topical reports was discussed at length. The Iraqi side's explanation began with a description of a series of high level meetings in mid-1987 where IAEC management acknowledged that the efforts with gaseous diffusion had failed, that the EMIS programme was not making the expected progress because of difficulties with the ion source and that the small centrifuge development programme was showing promise. This led to a decision to cancel the gaseous diffusion programme and to dramatically increase support to the centrifuge development effort. A further decision was taken that the increased investment required high level management attention. The manager of the set of activities organized under the code name PC-3, Dr. Jaffar Dhia Jaffar, was deemed too busy (and committed to the EMIS programme) to give an enlarged centrifuge development programme the required attention and the effort

was placed directly under the Chairman, IAEC, Dr. Human Abdel Khalig Ghaffour. The Iraqi side maintained that all documentation related to the centrifuge work was kept separate from that associated with PC-3 activities because it was organizationally separate. The Iraqis then went on to provide an often repeated explanation regarding their inability to produce any centrifuge related documentation. They stated that for security reasons, all documentation related to the centrifuge programme, similar to documentation associated with a number of other activities, was kept under very tight control. In the immediate aftermath of the Gulf War, and prior to resolution 687, the Iraqi Government ordered that all documentation related to sensitive activities be collected and handed over to the army for destruction. The Iraqi side reiterated that these activities were carried out in a particularly conscientious way as regards the documentation for the centrifuge programme.

10. The technical discussions were useful and provided a more consistent picture of the Iraqi centrifuge development programme. A detailed description of the work carried out by the specialist in rotor dynamics was particularly helpful. He described his work for the IAEC as beginning in 1987 at a time when they were having difficulties with the damping system of the Beams centrifuge. He concluded that the current design did not lend itself to accurate modeling/simulation on the computer and advised the IAEC to adopt a different type of damping system that could be more accurately modeled. Success with this design on the test rigs at Al Tuwaitha prompted the IAEC to come back to him for advice when they were working to develop the Zippe-type centrifuge bottom damper in 1988-1989. The specialist described how he had modeled the dynamics of a total Zippe-type centrifuge system using a custom designed rotor dynamics computer programme he had developed. He provided specific details on how the precise design of the end cap rim had been established and how he was able to recommend to the IAEC changes in the design of the carbon fibre rotors being manufactured outside Iraq. The specialist made frequent reference to open literature sources he had accessed in the course of his development work. These discussions made it even more obvious that basic centrifuge design data was provided from outside Iraq. However, the description of problems encountered and solved were generally credible. Prior to these discussions, this kind of detailed input had been sought but not provided. Technical data provided by other experts pertaining to such things as flow-forming development work, the dimensions of the 350-grade maraging steel tubes as procured, work on heat treatment, centrifuge process testing, etc., were consistent with past declarations. Most of the work on UF_6 production process development was described as having been carried out as an activity associated

with the gaseous diffusion programme. The description was consistent with the information on this work contained in the PC-3 reports.

11. Questions regarding specific procurements and procurement practices came up throughout the discussions. The Iraqi side invariably responded with a statement that the Iraqi Government had repeatedly made its position clear that this kind of information would not be provided. The Iraqi side was asked whether they would confirm information on the manufacture of carbon rotor tubes recently contained in Western technical press reports. They refused to do this, again citing their government's position. The responses to questions on how or on what basis materials were selected (irrespective of subsequent procurements) were vague and generally not credible.

ACTIVITIES RELATED TO NUCLEAR MATERIALS

12. In addition to the assessment of the irradiated fuel removal problem, a number of nuclear material related follow-up and monitoring activities were carried out during the fifteenth mission:

- Detailed analysis of Iraqi uranium metallurgy work in support of a weapons feasibility study and on armour penetrator programme described in progress reports, in combination with the results from the evaluation of uranium metal samples removed from Iraq, have resulted in a number of inconsistencies with Iraqi declarations regarding the size, location and intent of their uranium metal programme. Follow-up activities included detailed examination of the induction furnace and reduction bomb (stored in Ash Shakyli Warehouse 13b), the examination and further sampling of the uranium metal reduction and casting specimens (Location C) and several interviews with Iraqi scientists involved in the uranium metallurgy programme. The Iraqi side stated that all reductions were done using magnesium metal (except for a few trials using calcium metal). They were unable to produce any of the magnesium fluoride slag or the magnesium metal feed but promised to look for it. The Iraqi side further stated that most production of the tonne of uranium metal was done during the second half of 1990. They acknowledged that the method used to produce the tonne of metal was insufficient to supply a penetrator programme of the size declared (the Iraqi side provided a letter from the Hatteen Establishment, dated 1 June 1990, requesting the production of 450,000 uranium penetrators).

- The Iraqi scientists were also asked if any work was done on plutonium metallurgy. The inspection team's interest resulted from a PC-3 report on plutonium slag recovery. The Iraqi side stated that they were planning studies on milligram quantities of plutonium associated with neutron initiator studies and needed to be able to recover scrap to support this work. They further indicated that the report in question was a proposal that does not reflect the state of the actual programme.

- Re-verifications of the irradiated fuel stored in the IRT-5000 core and adjacent storage area were carried out. Twenty-nine out of the 76 fuel assemblies were selected at random and measured. Remedial activities to correct the water levels in the storage tanks at Location B were also carried out. The seal on one of the storage tanks was found broken. Re-verification of the contents will be scheduled for a future inspection. Waste containing uranium (216 drums containing, according to Iraqi declarations, more than 10 tonnes of uranium) had been transported from Al Jezira to Location C at Al Tuwaitha by the Iraqi side prior to the beginning of the fifteenth mission. The material was weighed and sampled for verification and transferred into one of the storage buildings at Location C, where it will be maintained under seal. This largely concludes an operation to recover the Al Jezira uranium waste that was initiated with the Iraqi side during the tenth IAEA inspection (February 1992).

- In the course of IAEA-12, as a result of sizeable inconsistencies in Iraqi material flow declarations, the Iraqi side came forward with a description of a series of undeclared activities carried out in the building 73 complex at the Al Tuwaitha site (see Figure 2). A complete record is contained in the twelfth inspection report. The analysis of uranium from filters, declared by the Iraqi side to have been installed in building 73A, show minor isotope concentrations and impurities inconsistent with the material declared by Iraq to have been used in this building. The Iraqi side agreed to review their records regarding the source and amounts of material processed in building 73A and to communicate the results in the near future. A discussion with the Iraqi side regarding the recovery of the building 73 complex waste containing uranium occurred but no action was taken. Further samples of the filters, declared feed materials and the building 73 waste were taken for follow-up.

- An evaluation of the measurement equipment necessary to verify the sources stored at Location C was carried out. Most of these sources, upon verification, can be released for non-proscribed activities. This verification activity will be scheduled as soon as the necessary equipment is assembled.

ACTIVITIES RELATED TO EQUIPMENT AND MATERIALS

13. Several meetings were held with the Iraqi side on the declaration required under the revised Annex 3 to the IAEA long-term monitoring plan. The general requirement was emphasized that under UNSC resolution 715, the Iraqi side is to update every six months, a declaration regarding facilities, materials and equipment starting from the situation as it existed on 1 January 1989 for the whole of Iraq. The Iraqi side indicated that they were having difficulties interpreting some of the specifications associated with machine tools, in the revised Annex 3. A meeting between Heads of the State Industrial Establishments and the inspection team experts helped to resolve a number of issues. Documents were provided with respect to equipment already tagged with IAEA seals for further evaluation by the IAEA Action Team. The Iraqi side informed the inspection team that they will officially submit a declaration covering the IAEC facilities as soon as possible after the inspection (a draft was given to the inspection team) and an amended declaration, covering the country as a whole, by the end of the year.

14. During the fifteenth mission the inspection team performed a number of site visits for the purpose of evaluating and, where appropriate, tagging equipment and key machine tools with an IAEA identification seal. The sites included:

- all known manufacturing facilities that had supported the Iraqi nuclear programme;

- several additional locations (Ibn Al Haytham Research Centre and warehouses, workshops of Project 144 at Taji and the Al Rafah Factory - part of Saddam General establishment) for follow-up on specific pieces of equipment identified in procurement data or in the Iraqi updated draft Annex 3 declaration; and

- equipment storage locations in the vicinity of Al Tuwaitha (Ash Shakyli warehouses and Al Nafad).

Together with the equipment evaluation and sealing activities from previous missions there are currently 84 pieces of equipment under IAEA seal. A list of this equipment by type and manufacturer is given in Table 2. The information in the table is based on the situation as it existed on 17 November 1992. Damaged equipment was excluded from the table whenever it was concluded by expert judgement that the equipment could not be restored to a state even approximating the corresponding specifications in the revised Annex 3 (e.g., 19 Matrix Churchill turning machines are in this category). Some equipment was tagged pending additional information from the manufacturer. No activities were observed at any of these sites that are proscribed under UNSC resolution 687 or 707.

15. At the request of the inspection team, a meeting with the Iraqi side was held to examine the practical arrangements and inspection activities necessary to monitor the use of various machine tools and other equipment. A number of ideas were discussed. Among them was the use and limitations of photo surveillance and other technical means, the implementation and subsequent maintenance of a logging system for keeping a record of machine utilization and the possibility of co-locating like machines. The last possibility provided the Iraqi side an opportunity to highlight their fears about national security issues arising from the lack of confidentiality of data that has been demonstrated by certain members of previous inspection teams. Overall it was a positive meeting with the Iraqi side acknowledging:

- their acceptance of random, short-notice inspections;

- their willingness to consolidate equipment at a small number of sites, to ease the monitoring problem for both sides;

- their acceptance of the inspection team's right to take samples and to verify the inventory of produced items; and

- their willingness to create and maintain a system of records and logbooks, to declare in advance and continuously document the use of monitored equipment.

Table 2

Equipment within specifications of Annex 3 (Revised)

	No.	Manufacturer	Status
Electron beam welder	2	Sciaky	Tagged
	2	Leybold Heraeus	Destroyed*
	1	Leybold Heraeus	Tagged
	1	Messer, Gressheim, Balzers	Destroyed*
Flow-forming machine	2	Leifelt	Tagged
	1	Kieserling & Albrecht	Tagged
	10	H & H Metalform	Tagged
Coordinate measurement machine	1	Leitz	Parts removed
	1	Mauser, Zeiss	Destroyed*
	2	DEA	Tagged
Turning machine	9	Schaublin	Tagged
	1	Schaublin	Destroyed**
	33[1]	Matrix Churchill	Tagged
		Magdeburg	Tagged
	3	Dorries	Tagged
	5		
Plasma spray system		Perkin Elmer	Destroyed*
	1	Plasmatechnik	Destroyed**
	2		
Milling machine		SHW	Tagged
	1	Innocenti	Tagged
	1	Maho	Tagged
	3	Schiess	Tagged
	6	Wotan	Tagged
	1		
Jig bore		Dixi	Tagged
	1	SIP	Tagged
	3		

* Destroyed during war
** Destroyed at the request of IAEA inspection teams

[1]Nineteen additional Matrix Churchill turning machines were seen in a damaged but still usable condition. They cannot be restored to the specifications given in the revised Annex 3.

The meeting provided a useful technical exchange that will continue in the near future.

16. Follow-up on EMIS related equipment resulted in several visits to the Al Nafad storage area. One objective was to confirm that the number of 1200mm double pole magnet cores is consistent with procurement data obtained from outside Iraq. This was accomplished. The totals depend upon how partial pieces are counted, but in all cases the figures were in reasonable agreement with the procurement data. The second objective was to verify the presence of the high voltage (35,000 V, 3 A) power supplies. Most of the electronic equipment at Al Nafad is smashed and thrown together in a large pile. A number of power supplies, consistent with the known installation at Tarmiya, were identified and manufacturer data taken for additional follow-up. Equipment related inspection at Ash Shakyli warehouse 13b focused primarily on the mixer-settlers and the 15kVA high frequency converters stored there. The numbers of the larger (5 and 1.5 litre) Metallextraktion AB mixer-settlers stored at Ash Shakyli are consistent with procurement data, but none of the small units (.3 and .5 litre) have been produced. The Iraqi side indicated that they would locate these items and show them to the inspection team, but this had not happened by the conclusion of the inspection. The nine 15 KVA high-frequency converters were again evaluated by experts. A final decision regarding the fate of this equipment awaits additional information from the manufacturer (REFU).

17. The destruction of the approximately 96 tonnes of 350-grade maraging steel, by re-melting and diluting with equal quantities of high carbon steel, was accomplished as scheduled. The operation was carried out over a three day period, under continuous observation by inspectors, at a foundry in Basra. Elements of the operation included verification that all the material presented and originally verified at Iskandariya had been transferred to Basra, visual confirmation that the maraging steel was transferred to the furnaces and melted/diluted and sampling of the resulting mixture. The mixture was recovered as six large ingots (~30 tonnes each) and seventeen small ingots (~3 tonnes each). Each ingot was marked and photographed for identification. The analysis of samples taken indicates that the operation was successful and the maraging steel is "rendered harmless".

18. The destruction of the R24 EMIS experimental system (a 1 to 5 scale model of the 1200mm system built to study the magnetic field) was carried out by the Iraqi side at the request of the inspection team. The items comprising the system included nine double pole magnets, the winding machine and the transport rails for the winding machine. The system was moved from its storage location at Ash Shakyli warehouse 13b to Al Nafad and destroyed with high temperature cutting torches. A large glass column for chemical enrichment, originally seen at Ash Shakyli warehouse 3, was confirmed as destroyed (apparently during the transfer to warehouse 13b).

19. As has been the case in the past, the Iraqi side provided all manpower and equipment necessary to efficiently meet the inspection requests for destruction.

INSPECTIONS AT DESIGNATED SITES AND OTHER ACTIVITIES

20. Six new sites were inspected by the IAEA team during the fifteenth mission. Two of the sites (Al Kindi and Al Kadissiyah) had been previously visited by UNSCOM missile teams. Designations for the other four sites was provided by UNSCOM. All sites, with the exception of Al Kindi, were inspected on short notice. A summary of the inspections follows:

Baghdad Office of the IAEC - The Baghdad offices of the IAEC are located in a small building near Karamana Square, just a few blocks from the Sheraton Hotel. The Iraqi counterparts explained that, prior to the Gulf War, this building had been used by the IAEC as a guesthouse. The building had suffered collateral damage from nearby bomb hits during the 1980s. It was extensively remodelled following the Gulf War to provide Baghdad office space for IAEC staff. All offices and the two conference rooms are fully furnished and well maintained, but showed no signs of occupancy. With the exception of a few reference books, there was no paper of any kind.

Al Shaheed Brass Factory - This facility, located about 80 km west of Baghdad near Fallujah, produces copper and brass ingots, rods, disks, tubing and wire. It does not produce finished components. The plant, according to statements by the Director General, was built as a turn key operation by a Western European firm.

Production began in 1984. The plant is clearly capable of manufacturing extruded copper tubing of the type used in EMIS coil windings. This probably explains the connection to PC-3 and the fact that the plant is named in Appendix V74 to the Iraqi FFC. However, the facility's DG denied any connection to the IAEC or special jobs for an "unknown" customer that other state establishments have described. The technical characteristics and production capabilities of the plant were inspected in detail. Nothing contrary to declarations by the Iraqi side were observed.

Al Kindi Establishment - The Al kindi Establishment for small missile artillery R & D (known as SAAD-16 during construction) is located about 5km north of Mosul. The site has been inspected by UNSCOM missile teams. The facilities were badly damaged during the Gulf War, but they have since been largely re-built to a high standard. The area of primary interest was the explosives research and test facilities. These facilities are clearly designed for pyrotechnics and propellant processing rather than for high explosives (HE) development. Some of the equipment could be utilized for small scale HE research however, none of the equipment (with the exception of a badly damaged Mauser/Zeiss high precision co-ordinate measuring machine) had the characteristics that require that they be included in the revised Annex 3 declarations. This site will continue to be of interest because the explosives facility could be modified to serve HE development needs.

Badush Dam Explosive Storage Bunker - The explosives storage bunker is located about 1.5 km west of the Badush Dam construction site. The bunker is comprised of three bays. One bay contained about 100 boxes of dynamite (from Al Qa Qaa) and boxes of detonators. The other two bays were empty except for debris. The bays had no utilities. The inspection team walked the site and found no other structures or entrances to the bunker within the fence. The bunker had obviously not been visited for a long time.

An Najaf Tyre Factory - The team inspected the "new tyre plant project" near An Najaf after a two hour notification. The plant belongs to the Ministry of Industry. Construction of the plant was stopped by the embargo, but it has since been re-started with a level of activity that indicates a high priority. All designs, construction and on-going operations (e.g. recycle) are consistent with the declaration. Carbon black is manufactured elsewhere and purchased for use here. There was no sign of graphite production or use.

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Al Kadissiyah Small Arms Plant - The Al Kadssiyah small arms plant is located adjacent to the Al Furat project site south of Baghdad. The site's Director General met with the inspection team and explained that the plant produces and maintains small arms and small calibre anti-aircraft guns. The team toured the main production hall - filled with hundreds of ordinary machine tools, lathes, mills and shears - and all support buildings. Nothing contrary to the Iraqi side's declaration was observed. Two new buildings are being constructed on the site with FAO serving as the general contractor. The explanation for both buildings was to increase production potential and to relieve the crowded conditions in the main production hall. No connection between this site and the neighbouring Al Furat site was observed.

21. In addition to equipment related inspections at all known manufacturing facilities that had supported the Iraqi nuclear programme, all known PC-3/IAEC research development and production related installations were also inspected during the fifteenth mission. The objectives of the inspections were generally related to the requirements of the long-term monitoring programme.

No activity proscribed under UNSC resolutions 687 or 707 were observed at any of the locations inspected.

22. The situations at Al Tarmiya and Ash Sharqat are essentially unchanged since IAEA-14. Some of the uninstalled chemical process equipment that had been stored in building 225 at Al Tarmiya (see Figure 3) has been moved to more secure areas in buildings 46 and 57 because of theft problems. The transformer repair work located in building 245 prior to its destruction has been re-established in the mechanical workshop building (building 271). Salvage work continues at Ash Sharqat.

23. During the inspection at Al Jezira, the Iraqi side indicated that they are preparing a proposal to the IAEA Action Team regarding an alternative use of the site. They want to establish a centre for the development of processes for recovery of minerals from indigenous ores. Their intent is to begin with iron ores, utilizing the small quality control laboratory. Construction is underway on a new administrative building and an annex to the laboratory. With an alternative use for the site in mind, it was agreed with the Iraqi side that they would remove some of the debris

from the former UCl_4 and UO_2 building sites and isolate both areas with a high fence with signs indicating that the enclosed areas are radioactively contaminated. The inspection team confirmed the removal of the uranium waste sludge (see paragraph 12) from one of the settling tanks. The Iraqi side estimates that the removed material comprises of more than 98% of the total uranium in the waste. The low uranium concentration solutions in the other two settling tanks will be allowed to continue to evaporate with recovery of the residue expected mid-year 1993. Small quantities of uranium (~ 500 kgs) in filters and organic solutions, remaining at Location 6 (near Suwaira) will be recovered and transferred to Location C, Al Tuwaitha. Solid low-level waste stored in drums stored in a garage adjacent to the settling tanks was inspected. The intent is to distribute the waste over the bottom of the contaminated settling tank and, once inspected, encase the material in concrete. The large petroleum tank at the Al Jezira Tank Farm used to store the uranium waste (prior to IAEA-10) was inspected. The tank has been thoroughly cleaned and was released for other uses. The entire site, including the open air equipment storage area, was visited by the inspection team. Previous judgements that the modest quality control laboratory offers no special capability and that the UCl_4 and UO_2 production buildings are totally destroyed, were confirmed.

24. The situation at Al Furat remain essentially unchanged. Air conditioning equipment has been removed from building 800 (see Figure 4) and some construction equipment (e.g. scaffolding) has been scavenged from the 801 building site. There continues to be noticeable deterioration in the facilities and construction supplies due to weather and animal infestation. As has been pointed out in numerous inspection reports, buildings 801 and 802 are far from complete - comprising only outer shells.

25. The Al Atheer/Hatteen sites were again inspected. Previous judgements that the Quality Control and Characterization buildings are lightly constructed without special technical features was confirmed by the inspection team. Remaining laboratories and office building are being used as part of the Al Furnass helicopter maintenance and design centre. Some equipment from Al Kindi has been moved here. The team inspected, for the first time by a nuclear team, some bermed facilities just south of the Hatteen headquarters building. These facilities were for the super gun programme and included five instrumentation points. The inspection team also saw, at the invitation from the Iraqi side, five Hadland CCD cameras first

declared to an UNSCOM missile team about one year ago but never inventoried. These cameras and associated accessories were inventoried and the details are being evaluated with respect to the cameras utility for HE testing.

26. The Al Hadr Air Force explosives site with an instrumentation bunker for observing large test explosions has been described in past inspection reports. It has no known connection to the nuclear weapons feasibility study programme. Its capability to support such studies needs to be evaluated. The team observed that the firing site had been used just prior to the inspection and all instrumentation had been removed.

27. A monitoring visit was conducted at the Al Hamath (Date Palm Tree Facility) site. There has been not activity at this location since IAEA-14. The large pit in the smaller of the two primary buildings - declared by the Iraqi side to have been started with the plan to develop a safer irradiated fuel storage location - remains unchanged.

28. The inspection team carried out a complete inspection of the Al Tuwaitha Nuclear Research Centre. The objective was to document current activities and to update inspection records with respect to the utilization of still existing or new facilities. Clean-up activities continue and several buildings have been or are in the process of being renovated and re-occupied. Examples include buildings 24 (Tammuz office building), 82 (physics department), 64 (engineering), 42 (library) and 9 (chemical analysis portion of the radiochemistry building). In all cases the work going on (e.g. civil engineering, light electronics, agriculture research) appeared consistent with the declarations. The agriculture research effort was particularly active. The agriculture research laboratory (building 4) is well equipped and fully occupied. A large presentation featuring displays describing individual research projects was set up in building 2 (former cafeteria) and was documented by the team. Several samples, smears and tree trunks, for tritium analysis were collected in or near building 22 (LAMA building) and other areas.

Figure 2

The Tuwaitha Site Map

Figure 3

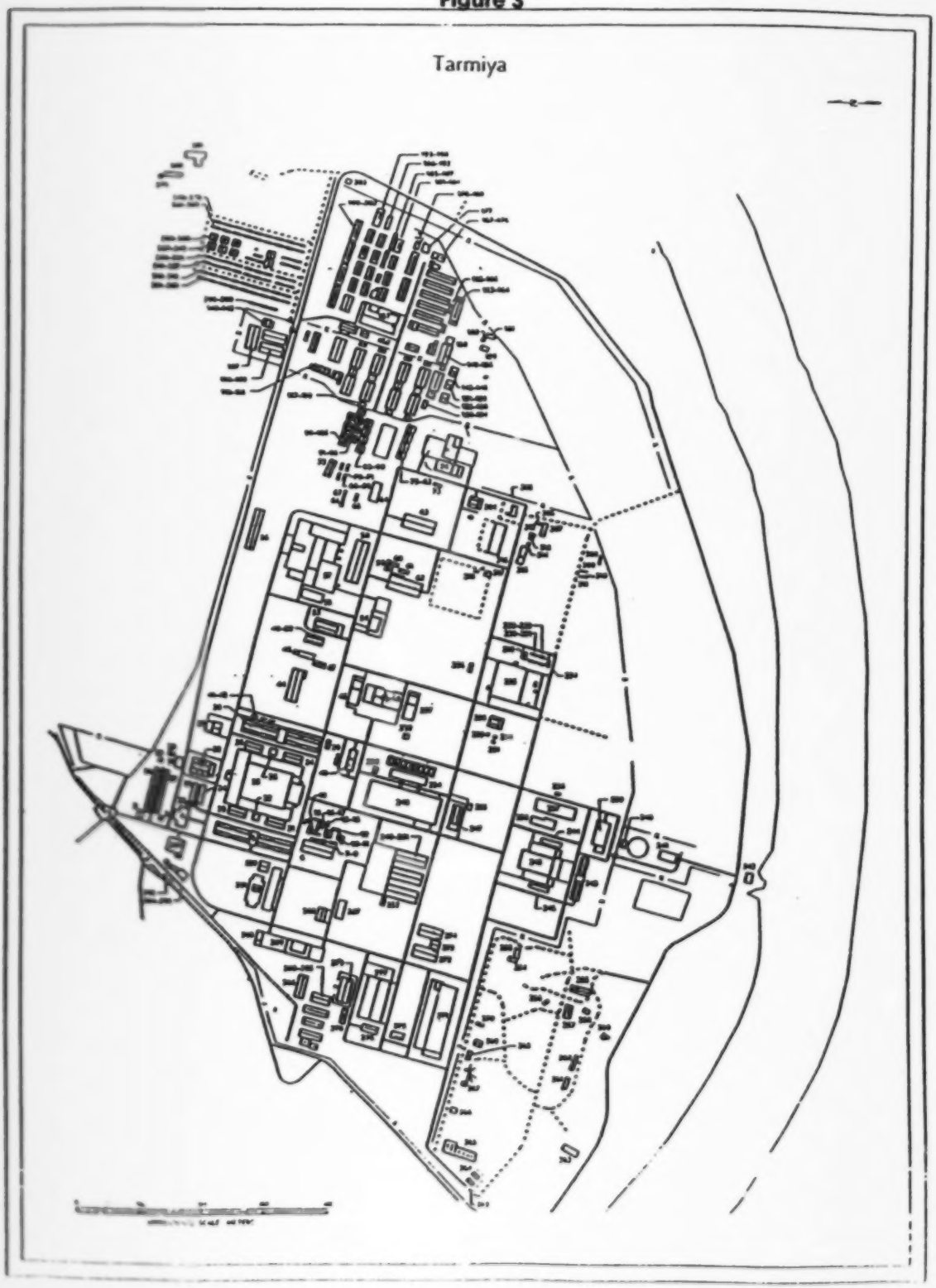
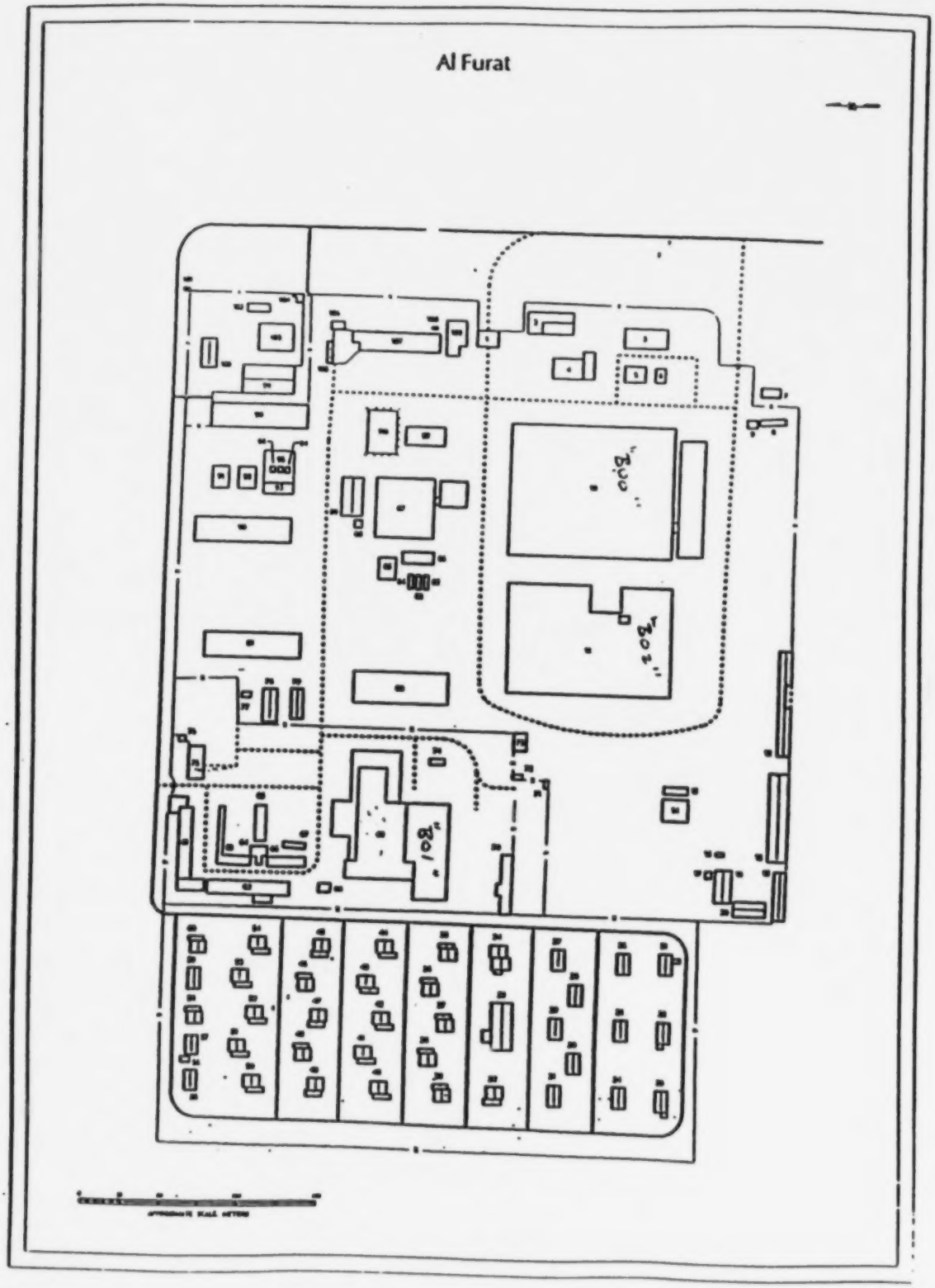


Figure 4



Annex 1

List of documents received or sent

15-01 Letter, D. Perricos to Dr. Al Hajjaj dated **9 November 1992**
Informing of activities on photographing and application of seals on equipment and material specified in Annex 3 (Long-term Monitoring Plan)

15-02 DRAFT Annex 3 declaration (updated) from Iraqi side dated **10 November 1992**

15-03 Letter, Dr. Al Hajjaj to D. Perricos dated **10 November 1992**
Indicating that in some areas in the Northern part of Iraq they cannot take any responsibilities regarding safety of team members and they cannot acknowledge any findings of the team

15-04 Letter, D. Perricos to Dr. Al Hajjaj dated **10 November 1992**
Extending invitation to certain scientists and engineers for discussion on enrichment processes

15-05 Letter D. Perricos to Dr. Al Hajjaj dated **12 November 1992**
Requesting the provision of safety data relating to safety of the storage of HMX high explosive as well as the location and quantities of any additional HMX in Iraq

15-06 Letter, D. Perricos to Dr. Al Hajjaj dated **13 November 1992**
Comments regarding the Iraqi draft Annex 3 declaration and suggestions regarding reporting under requirements of INFCIRC/209/Rev.1

15-07 Letter, D. Perricos to Dr. Al Hajjaj dated **14 November 1992**
Request for data regarding two irradiated natural uranium fuel assemblies stored at Location B

15-08 Letter, D. Perricos to Dr. Al Hajjaj dated **14 November 1992**
Requesting the description of the complete R24 EMIS experimental system and the destruction of the di-pole magnets and the winding machine

15-09 Letter, D. Perricos to Dr. Al Hajjaj dated **15 November 1992**
Requesting the tracing of graphite machining equipment from Tuwaitha and information on NEC-750 computer original location.

15-10 Letter, D. Perricos to Dr. Al Hajjaj dated **15 November 1992**
Requesting emptying of waste tanks at building complex 73 in Tuwaitha and collection of the liquids in drums

15-11 Letter, D. Perricos to Dr. Al Hajjaj dated **15 November 1992**
Request for explanations on the stack foundations situated on berm behind building 80 (EMIS project) in Tuwaitha

15-12 Letter, D. Perricos to Dr. Al Hajjaj dated **16 November 1992**
Regarding 15 November inspection at Al Jezira site and actions agreed upon regarding buildings on site and on waste material

15-13 Letter, D. Perricos to Dr. Al Hajjaj dated **16 November 1992**
Informing of inventory of mixer-settlers at Ash Shakyli building 13b and requesting location of additional mixer settlers procured by the IAEC

15-14 Letter, D. Perricos to Dr. Al Hajjaj dated **16 November 1992**
Referring to discussions on U metal on 15 November 1992 and requesting design drawings and correspondence on uranium penetrators program

15-15 Letter, D. Perricos to Dr. Al Hajjaj dated **16 November 1992**
Acknowledgement of receipt of documents describing specification of some machine tools listed in attachment to letter

15-16 Letter, Dr. Al Hajjaj to D. Perricos dated **17 November 1992**
Response to item 15-08 above regarding Project 105 (R-24 scale double pole magnet system)

15-17 Letter, Dr. Al Hajjaj to D. Perricos dated **17 November 1992**
Submitting latest draft of the updated Annex 3 declaration (+ 12 Annexes)

15-18 Letter, Dr. Al Hajjaj to M. Zifferero dated **17 November 1992**
On Gamma Irradiation Plant, referring to M. Zifferero's letter of 8 October 1992. (Attached 5 diagrammatic documents on the Gamma Irradiation Plant)

15-19 Letter, Dr. Al Hajjaj to D. Perricos dated **17 November 1992** on UO_2

15-20 Letter, Dr. Al Hajjaj to D. Perricos dated **17 November 1992**
Regarding NEC-750. (response to item 15-09 above)

15-21 Letter, Dr. Al Hajjaj to D. Perricos (handwritten in English) dated **17 November 1992**
Referring to D. Perricos's letter dated 14 November (item 15-07 above) about unprocessed irradiated fuel assemblies EK07

15-22 Letter, Dr. Al Hajjaj to D. Perricos dated **18 November 1992**
Referring to D.Perricos's letter of 16 November 1992 (item 15-14 above) and attaching design sketches for U penetrators and relevant letters from the Hatteen Organization

15-23 Letter, D. Perricos to Dr. Al Hajjaj dated **18 November 1992**
Listing samples taken by inspection team and referring to technical documents found in building 73 complex in Tuwaitha to be removed to IAEA HQ, Vienna

15-24 Latest list of sources in Location C and Tuwaitha